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# PATENT SPECIFICATION

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## COMPLETE SPECIFICATION.

## Improvements in Electrically Driven Gyroscopes.

I, Archibald Montgomery Low, Captain in His Majesty's Army, of Royal Air Force Experimental Works, Feltham, Middlesex, do hereby declare the nature of this invention and in what manner the same is to be performed, to be particularly described and ascertained in and by the following statement:—

This invention relates to electrically driven gyroscopes and is an improvement in or modification of the invention claimed in the Specification of Letters Patent No. 1267 of 1918.

In the main specification I have described means whereby the gyroscope member of an electrically driven gyroscope may be deflected to one side or the other for the purpose of steering the torpedo or other contrivance in connection with which the gyroscope is employed.

The present invention has for its object to provide other means whereby the steering or guiding of an electrically driven gyroscope may be effected, and the invention consists in a modification of the electrically driven gyroscope claimed in the Specification of Letters Patent No. 1267 of 1918 comprising one or more electro magnets adapted to attract or repel the gyroscope member or casing in association therewith in one direction or the other for the purpose of steering.

The invention also consists in a modification of the electrically driven gyroscope claimed in the Specification of Letters Patent No. 1267 of 1918 comprising an electro magnetically operated brake adapted to act upon the spindle or other rotating part in connection with the gyroscopic member in order to retard or accelerate the speed so as to cause the gyroscope to precess in one direction or the other for the purpose of steering.

The invention also consists in the forms of apparatus hereinafter described and illustrated.

The accompanying drawings illustrate two modes of carrying out the invention.

Figure 1 is a front elevation showing one form of apparatus in accordance with the invention.

Figure 2 is a side elevation of the apparatus shewn in Figure 1 while

Figure 3 is a cross sectional elevation showing a modified form of apparatus.

In carrying my invention into effect in one convenient manner as illustrated in Figures 1 and 2 I form my improved gyroscope with a gyroscope wheel of any suitable formation mounted in a casing *a* which in turn is carried by a gimbal ring *b* in such a manner as to provide the three axes *c d* and *e* at right angles to one another.

The gyroscope wheel may be driven electrically in the manner described in the main specification and on suitable brackets *f* formed with or secured to the gimbal ring I mount electro magnets *g*, these being arranged upon either side of the gimbal ring and preferably in such a manner as not to interfere with the balance of the gyroscope.

By energising one or other of these sets of electro magnets the wheel casing *a* may be attracted or repelled in one direction or the other with the result that the gyroscope will be caused to precess in one direction or the other according as the steering of the device is to be effected.

It is obvious that the electro magnets may be adapted to act upon the gyroscope wheel or member instead of upon the casing and the invention is not to be confined to any particular number or arrangement of magnets as these may be varied as may be found most suited to any particular practical requirements.

Figure 3 shows a modification of the

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invention in which the gyroscope proper is formed with the gyroscope wheel $b^1$ arranged as an armature and mounted in the casing *a*, the three axes *c d e* being provided as before.

The spindle *d'* of the gyroscope member is adapted to be acted upon by an electro magnetically controlled or electro magnetically operated brake with a view to accelerating or retarding the speed of the gyroscopic member in order to cause precession in one direction or the other. In the form illustrated the brake consists of a disc *h* mounted upon the shaft *d* and having a boss *i* and a spring-controlled disc *k* adapted to press upon the disc *h* or upon fibre or other washers *l* located between the discs. The boss of the disc *k* forms the core of an electro magnet *m* so that by decreasing or increasing the strength of the current flowing through the winding of the magnet the spring controlling the disc *k* may be brought more or less into action with the result that the braking upon the spindle will be greater or less thus retarding or accelerating the speed of the gyroscope member in order to cause the precession in one direction or the other.

It is to be understood that while the form of electro magnetically operated brake is a convenient one to adopt in practice the invention is not to be confined to this construction as I may employ any other form or arrangement of electro-magnetically operated spring or other brake adapted to act either upon the spindle or some other rotating part in association with the gyroscope member.

Having now particularly described and ascertained the nature of my said invention, and in what manner the same is to be performed, I declare that what I claim is:—

1. A modification of the electrically driven gyroscope claimed in the Specification of Letters Patent No. 1267 of 1918 comprising one or more electro magnets adapted to attract or repel the gyroscope member or its casing in one direction or the other, substantially as and for the purpose set forth.

2. A modification of the electrically driven gyroscope claimed in the Specification of Letters Patent No. 1267 of 1918 comprising an electro magnetically controlled or electro-magnetically operated brake adapted to act upon the spindle or other rotating part in connection with the gyroscope wheel in order to retard or accelerate the speed of the latter, substantially as and for the purpose set forth.

3. An improved electrically driven gyroscope, substantially as described with reference to Figures 1 and 2 of the accompanying drawing.

4. An improved electrically driven gyroscope, substantially as described with reference to Figure 3 of the accompanying drawing.

Dated this 10th day of July, 1918.

MARKS & CLERK.

Redhill: Printed for His Majesty's Stationery Office, by Love & Malcomson, Ltd.—1923.

*[This Drawing is a reproduction of the Original on a reduced scale.]*

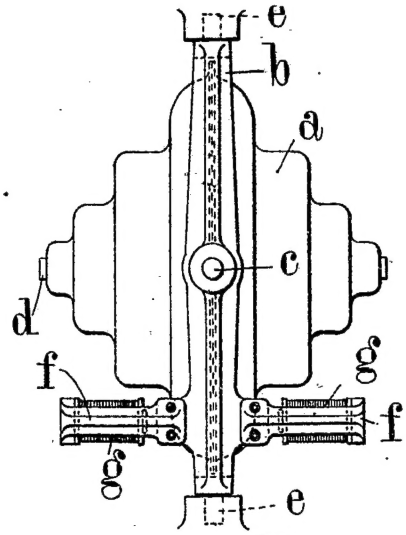

Fig.1

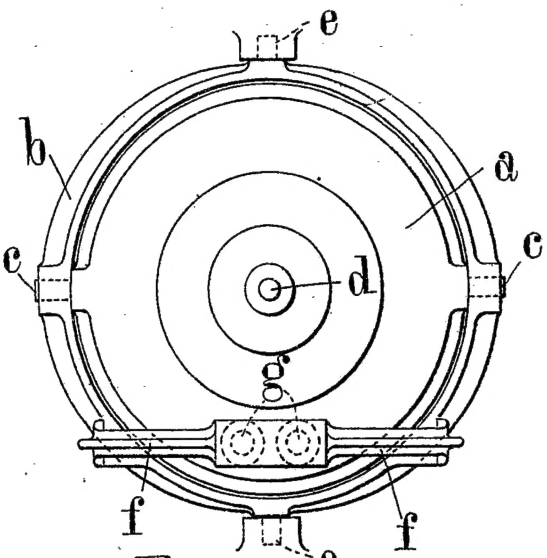

Fig.2

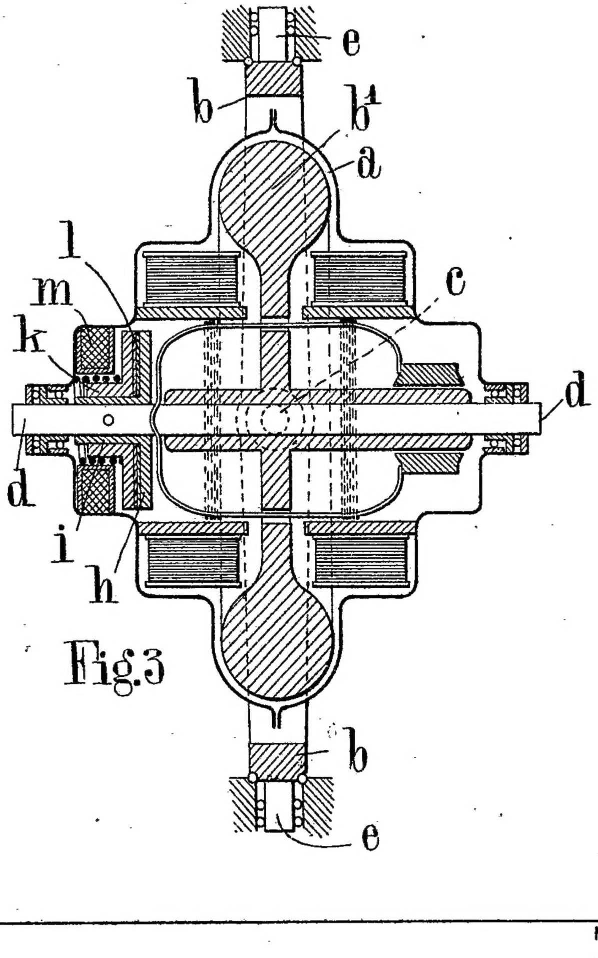

Fig.3